

ST STEPHEN'S SCHOOL
Year 11 Specialist
Investigation 1, 2009 – validation test

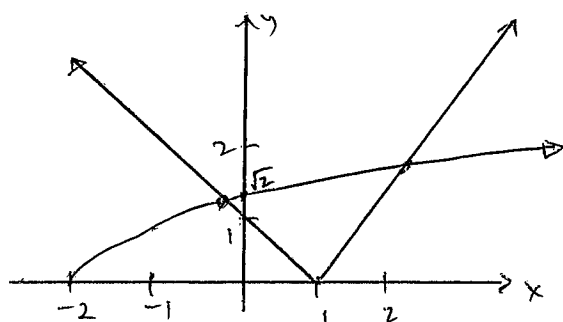


Total: 30 marks. Time allowed: 45 mins. Calculators and notes allowed.

1. (12 marks)

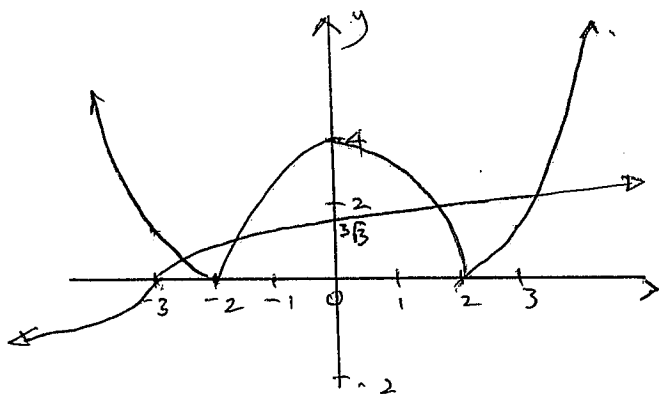
Solve the following equations graphically, sketching the graphs that you have used, indicating the x-intercepts. (Do not rearrange the equations)

(a) $|x-1| = \sqrt{x+2}$



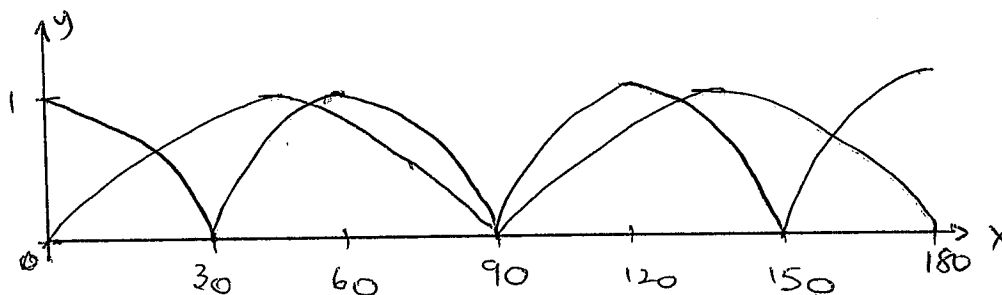
$$\underline{x = -0.303 \text{ or } 3.303}$$

(b) $|x^2 - 4| = \sqrt[3]{x+3}$



$$\underline{x = -2.22, -1.71, 1.53 \text{ or } 1.75}$$

(c) $y = |\sin(2x)|$ and $y = |\cos(3x)|$, solve the equations simultaneously for $0 \leq x \leq 180$

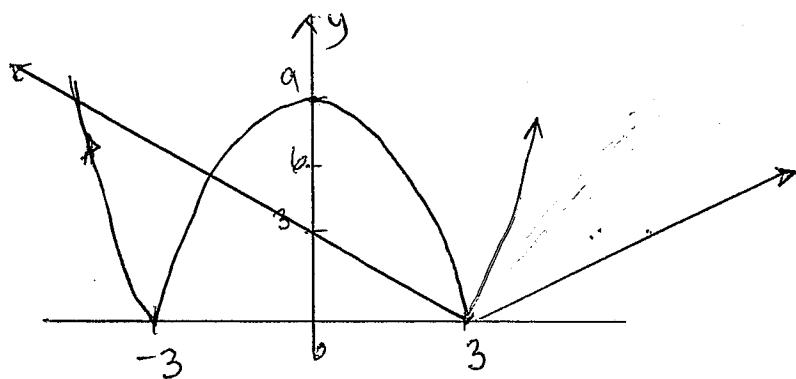


$(18, 0.588), (54, 0.95), (90, 0), (126, 0.95), (162, 0.588)$

2. (12 marks)

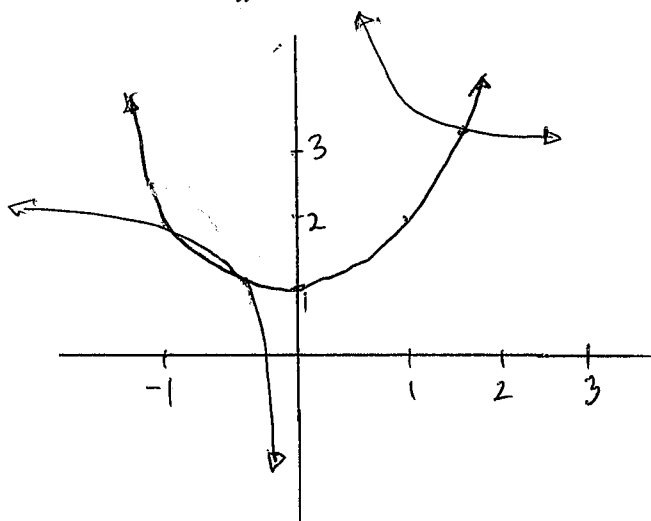
Solve the following inequalities graphically, sketching the graphs that you have used.
(Do not rearrange the equations)

(a) $|x^2 - 9| \leq |x - 3|$



$-4 \leq x \leq 2$ or $x = 3$

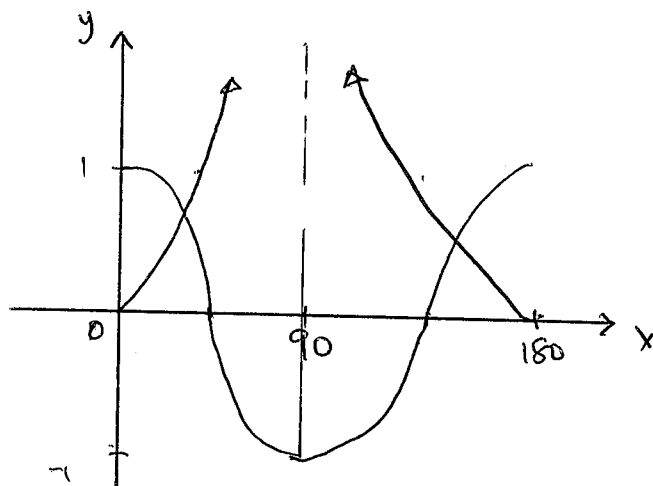
$$(b) 2^{|x|} \geq \frac{1}{x} + 3$$



$$x \leq -1 \text{ or } -0.78 \leq x \leq 0$$

$$\text{or } x \geq 1.83$$

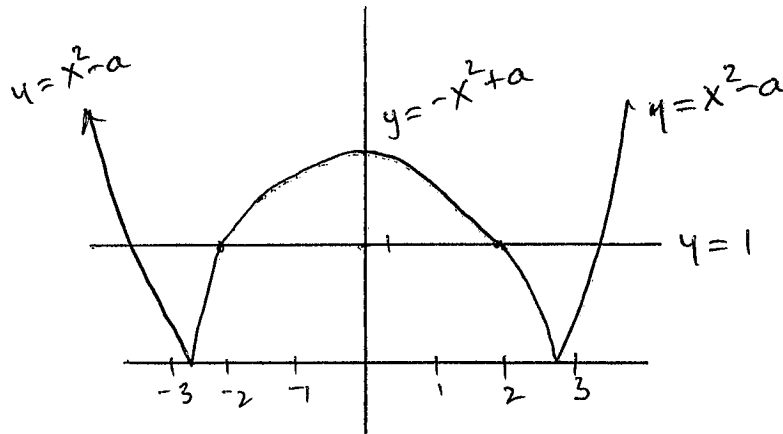
$$(c) |\tan x| \leq \cos(2x) \text{ for } -180 \leq x \leq 180$$



$$0 \leq x \leq 28.5 \text{ or } 151.5 \leq x \leq 180^\circ$$

3. (6 marks)

Given that $|x^2 - a| = 1$ has two solutions at $x = \pm 2$, justifying your answer, find a and the other 2 solutions exactly.



$$-x^2 + a = 1 \text{ at } x = \pm 2$$

$$\therefore -4 + a = 1$$

$$\underline{a = 5}$$

$$x^2 - 5 = 1$$

$$x^2 = 6$$

$$\underline{x = \pm \sqrt{6}}$$